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JANUARY 31, 1939

FOREST RESOURCES OF CENTRAL GEORGIA

by
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A Progress Report by
THE SOUTHERN FOREST SURVEY
I. F. Eldredge, Regional Survey Director

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FOREWORD

The Forest Survey, which is a part of the United States Forest Service, was authorized by the McSweeney-McNary Forest Research Act of 1928 to make a nation-wide study of our forest resources. The five-fold object of this study is: (1) to make an inventory of the present supply of timber and other forest products, (2) to ascertain the rate at which this supply is being increased through growth, (3) to determine the rate at which this supply is being diminished through industrial and local use, windfall, fire, and disease, (4) to determine the present requirement and the probable future trend in the requirement for timber and other forest products, and (5) to correlate these findings with existing and anticipated economic conditions, in order that policies may be formulated for the effective use of lands suitable for forest production.

This release is based on a field survey made Oct. 26, 1935, to Mar. 7, 1936, and on two field canvasses of forest industrial plants to determine forest drain, the last of which was completed during June 1937. It should be regarded only as a progress report since it contains Forest Survey data that will be included in complete reports to be published later, and that, although considered reliable, are subject to correction or amplification as the work of computation proceeds. Item 4 above, which is being studied on a national basis, is not discussed in this report.

In the interpretation of these data, it must be noted that owing to the sampling method used in collecting them, the greater the number of samples in any given classification the more accurate are the data for that classification. Hence classes that are of infrequent occurrence and relatively small in quantity generally cannot be determined with as high a degree of accuracy as classes that occur more frequently and in substantially greater quantities. Small tabular items are to be taken as showing, not the exact magnitude of the classes involved, but their relative magnitude in comparison with those of other classes.

In the South, the Forest Survey functions as an activity of the Southern Forest Experiment Station with headquarters at New Orleans, La.

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FOREST RESOURCES OF CENTRAL GEORGIA

General Description

Central Georgia (Forest Survey unit No. 3) was one of the first widely-developed and prosperous agricultural areas of the Lower South; but erosion, the boll-weevil, and destructive methods of cultivation, together with the westward march of cotton farming, have caused such widespread abandonment of tilled land that many thousands of acres once white with cotton have reverted to the forests which originally covered them. Slowly a maladjustment has taken place in the pattern of human affairs, and today thinking people of this once prosperous section of the State are searching for ways and means of building up new sources of wealth. Consequently an account of the forest resources and wood-using industries of this unit, based upon the recent inventory made by the Forest Survey, is of particular interest, because it may shed some light on the extent to which the forests of the section may help in returning a measure of prosperity to the land.

Extending southwesterly across the State in a belt about 80 miles wide (fig. 1), this unit includes 49 counties, with an aggregate area of almost 11 million acres. Slightly more than half the land is classed as forest, with loblolly and shortleaf pines and gums predominating. Physiographically, there are two distinct parts of central Georgia, but they are combined in this report because no appreciable difference occurs in their forest resources. The northern half, in the lower Piedmont topographic province, with elevations seldom exceeding 900 feet above sea level, is distinguished by hills, with occasional steep slopes and ridges. The southern half, in the gently rolling upper Coastal Plain, with elevations seldom surpassing 500 feet, is separated from the Piedmont by the Fall Line (the shoreline of the ancient ocean), which may be traced near Augusta, Macon, and Columbus.

The principal rivers are the Savannah, forming the eastern boundary of the area; the Chattahoochee, forming the western boundary; and the Ogeechee, Ocmulgee, Oconee, and Flint Rivers flowing through or across it. The first two were great thoroughfares of transportation until about 1870, when the railroads became important, but in recent years river traffic has been light. Well-developed railroad facilities, including the Southern, Central of Georgia, Seaboard Air Line, and others, serve this unit. Also a well-correlated system of paved and gravel highways and graded country roads make all parts of the area accessible to motor vehicles.

An abundant supply of electric power is available at more than 20 plants, of which half are hydro-electric located chiefly on the Chattahoochee, Flint, Ocmulgee, and Savannah Rivers. In 1937, the hydro-electric plants had a total daily capacity of about 100,000 kilowatts and their total output for the year was almost 700 million kilowatt-hours. As to minerals, clays, bauxite, limestone, fuller's earth, and travertine are found locally in commercial quantities.

According to Census data, the total population of the area reached a peak in 1920 with 818,000 people, but by 1930 it had declined to 758,000, a loss of about 7 percent. It is significant, however, that while the total number of people declined, and there was an alarming shrinkage in rural

population, the urban population increased 14 percent between 1920 and 1930. In 1930 Augusta had a population of 60,000; Macon, 54,000; Columbus, 43,000; and Albany, 15,000. For the area as a whole, however, the population is mostly rural, for only 29 percent of the people live in towns or cities having a population of 2,500 or more. Agricultural products, textiles (with Columbus, Macon, Augusta, and Thomaston, the principal centers), and wood-products form the bases for the most important industries. Agriculture, which gives employment to about 45 percent of the workers, is the principal means of livelihood, although many of the farmers find part-time work in logging and in the manufacture of forest products. Corn and cotton are the main agricultural crops, but orchard, forage, and truck crops also are grown. Yields of corn are light; in 1929 the average yield was about 11 bushels per acre harvested, and in 1934, 8 bushels. Yields per acre of cotton, the principal cash crop, are from 0.36 to 0.44 bales per acre, slightly higher than the average for the entire cotton belt.

Approximately 57 percent of the farm acreage is operated by tenants. This absentee-landlord and tenant-cropper system, which unfortunately has led to a deterioration of both human and soil resources, is largely the result of the old plantation economy, especially prevalent in the lower Piedmont.

In 1935, according to the Agricultural Census, in central Georgia there was a total farm area of 7,886,000 acres, or approximately 73 percent of the entire area. Of this, farm woodlands occupied 3,315,000 acres. There were 64,000 separate farms, a farm being defined as "all the land which is directly farmed by one person, either by his own labor alone or with the assistance of members of his household, or hired employees." There is a wide variation in the size of the farms, as shown by table 1, but the average size is 123 acres, of which approximately 52 acres is in woodland pasture or woodland not used for pasture. Approximately 63 percent of the total number of farms have less than 100 acres; but these small farms altogether include only 22 percent of the total farm acreage. The extent of the large holdings is further indicated by the fact that while less than 4 percent of the farms have over 500 acres, these large farms include more than 26 percent of the total farm area.

Table 1. - Number and acreage of farms classed according to size, 1935
(Data from Agricultural Census)

Size	Number of farms	Proportion of total number	Acreage in farms	Proportion of total acreage
<u>Acres</u>	<u>Number</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>
Less than 50	24,185	37.8	676,628	8.6
50 - 99	15,853	24.8	1,067,980	13.5
100 - 499	21,700	33.9	4,074,108	51.7
500 - 999	1,605	2.5	1,051,743	13.3
1000 and over	611	1.0	1,015,910	12.9
Total	63,954	100.0	7,886,369	100.0

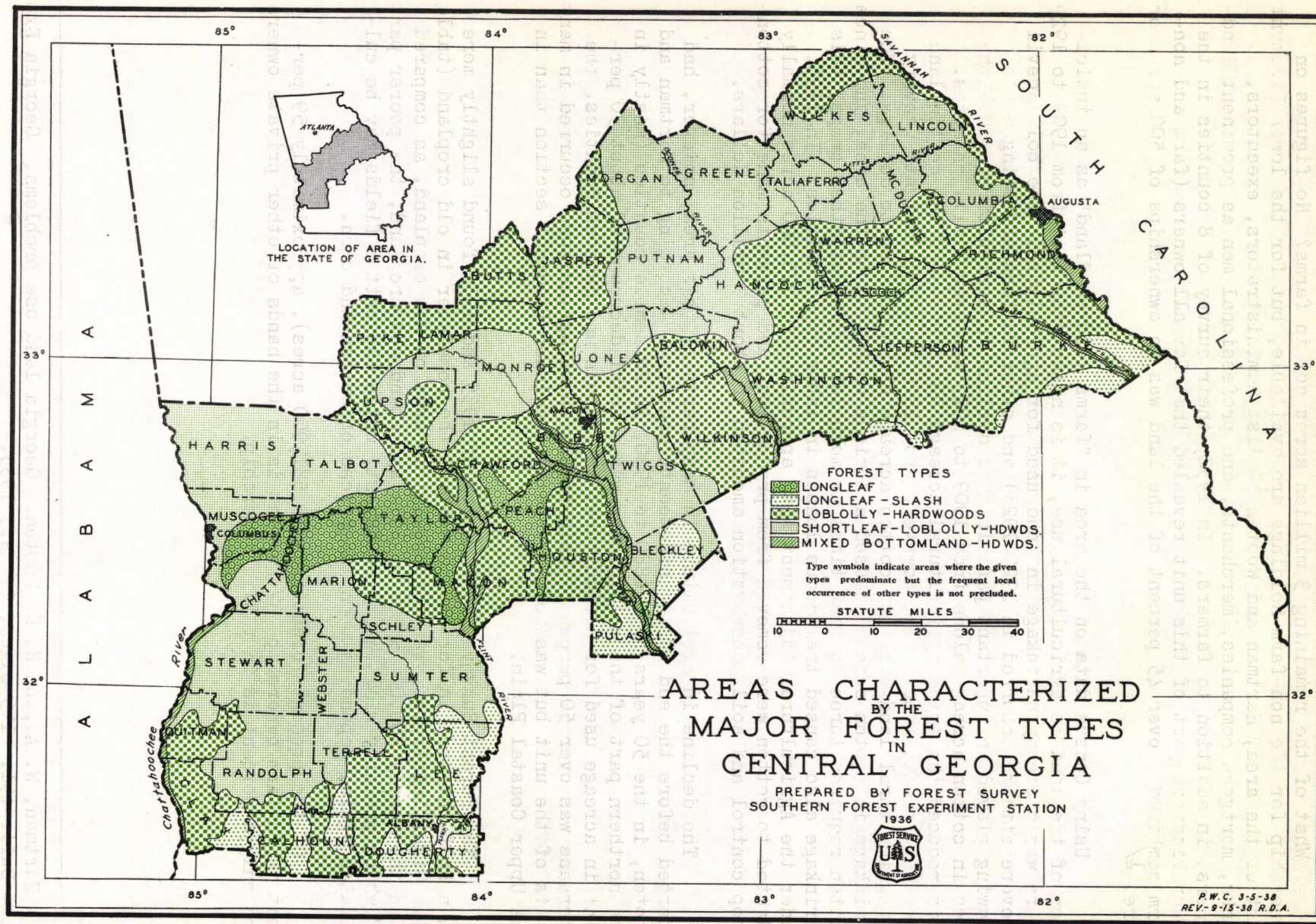


FIGURE 1- FOREST TYPE MAP.

What of the remaining 3 million acres not in farms? No figures on ownership for the non-farm holdings are available, but for the lower Piedmont part of the area, Hartman and Wooten ^{1/} list administrators, executors, banks, mortgage companies, merchants, and professional men as prominent land-owners, in addition to farmers. In 1932, their survey of 8 counties in the lower Piedmont part of this unit revealed that for all owners (farm and non-farm combined), over 45 percent of the land was in ownerships of 500 acres or more. ^{1/}

Using Census data on the area in "farms less woodland" as an indication of the land in agricultural use, it is noteworthy that from 1909 to 1929 there was a steady shrinkage in land used for agriculture. The boll weevil (severe attacks occurred in 1920-1925) and other factors affecting cotton growing played an important part in this decline in agriculture, since the loss in cotton acreage alone from 1909 to 1929 was over 1 million acres. This reduced the total agricultural acreage 20 percent and the cotton land over 50 percent. There was, however, from 1929 to 1934 a slight recovery in agricultural land use; but cotton acreage has continued to decline. The shrinkage in cotton acreage caused a serious cash loss to the area, and since cotton requires three to four times as much labor as most other crops, this shrinkage also caused tremendous losses in labor opportunities. In 1936, under the Agricultural Adjustment Act, approximately 276,000 acres normally planted to cotton were removed from production, and payments made for cotton-crop control and soil conservation amounted to about 3 million dollars.

The decline in agriculture in many parts of this area, however, had started before the end of the nineteenth century. According to Hartman and Wooten, in the 50 years from 1880 to 1930, in 26 sample counties (mostly in the northern part of the unit), there was a total decrease of about 30 percent in acreage used for agriculture; in Lincoln and Hancock Counties, the decrease was over 50 percent. This breakdown of agriculture occurred in many parts of the unit but was more severe in the lower Piedmont section than in the Upper Coastal Plain.

The Forest Survey in the winter of 1935 and 1936 found slightly more than half the area in forest and most of the remainder in old cropland (table 2). Significant, too, was the negligible area of new cropland, as compared with the nearly 800,000 acres of idle and abandoned cropland, the poorer part of which probably will revert to forest, while the better fields may be cultivated again, depending upon the prices of cotton and corn.

Of the present forest area (5,581,900 acres), approximately 59 percent is in farm ownership, 37 percent is in the hands of other private owners, and only 4 percent is in public ownership.

^{1/} Hartman, W. A., and H. H. Wooten. Georgia land use problems. Georgia Exp. Sta. Bull. 191. 195 pages, illus., 1935.

Table 2. - Land area classified according to land use, 1936

Land	Area	Proportion of total area
	<u>Acres</u>	<u>Percent</u>
Forest	<u>1/5,581,900</u>	<u>51.3</u>
Nonforest:		
Agricultural:		
In cultivation:		
Old cropland	3,990,300	36.7
New cropland	40,100	.4
Out of cultivation:		
Idle	391,400	3.6
Abandoned	405,700	3.7
Pasture	<u>214,900</u>	<u>2.0</u>
Total agriculture	5,042,400	46.4
Other nonforest	<u>253,200</u>	<u>2.3</u>
Total nonforest	<u>5,295,600</u>	<u>48.7</u>
Total forest and nonforest	10,877,500	100.0

1/ Includes 900 acres of nonproductive forest land.

The average annual rainfall is between 40 and 50 inches, and the number of frost-free days per annum ranges between 210 and 240. North of the Fall Line the soils are generally clay or sandy-clay loams, and a large portion of the land is now unsuited to cultivated crops. South of this line the soils are sandy or fine sandy loams, often with red clay subsoils. Some of the soils are classed as highly productive, but most of them are so light that they are easily eroded when cultivated. In the Lower Piedmont part of the area, erosion has been very active for such a long time that, according to Hartman and Wooten, little of the original surface is left except in bottom lands or forested areas.

In some form and to some degree, erosion is occurring almost everywhere in the unit, but in this report only the well-marked and destructive stages are recognized (table 3). In the field classification, the following forms of erosion were recorded: (1) sheet erosion, where the soil is washing off from a generally smooth surface; (2) shoestring erosion, where the soil surface is cut into, and a system of small, branching gullies a few inches to 2 feet deep is formed; and (3) gully erosion, where the soil surface is severely cut into and is being destroyed by systems of deep gullies. Marked erosion, in one or more of the three forms, is found on 31 percent of the abandoned cropland, 22 percent of the idle cropland, 16 percent of the pasture, and 18 percent of the cropland in cultivation, but on only 11 percent of the forest, even though the forest is generally located on the steepest slopes. In many places where erosion is found in the forest, it is caused by run-off from cultivated fields situated higher up the slope. Also erosion is often found in forests that have been established recently on eroding abandoned fields, but when a grass- or tree-growth is well established, erosion is generally checked.

Table 3. - Correlation of land use with erosion

Land use	Type of erosion				Total
	None or arrested	Sheet	Shoestring	Gullies	
	----- <u>Acres</u> -----				
Forest	4,954,100	131,700	211,500	284,600	5,581,900
Cropland in cultivation	3,323,800	485,700	194,600	26,300	4,030,400
Idle cropland	306,000	52,700	26,800	5,900	391,400
Abandoned cropland	280,400	57,200	41,200	26,900	405,700
Pasture	181,400	17,600	10,100	5,800	214,900
Total	9,045,700	744,900	484,200	349,500	10,624,300
Percent of total	85.1	7.0	4.6	3.3	100.0

Description of the Forest

Loblolly pine, the principal species in the forest, occurs on all topographic situations in pure stands or with other pines (chiefly shortleaf) and with hardwoods. On the rolling uplands, which contain 83 percent of the forest area, loblolly pine generally occupies the better sites, while shortleaf pine and upland hardwoods predominate on the poorer ones. Loblolly pine is also found in the branch heads, river bottoms, and swamps; but here the bottom-land hardwoods predominate. Longleaf pine stands are found on the sand hills in the western part of the unit.

The prevalence of certain characteristic forest types over large areas is shown on the map (fig. 1), although within the broad ranges there delineated many small intermingled areas of other types occur as well as areas of cleared land. In table 4 will be found the area occupied by each of the four major forest type-groups. Pine and pine-hardwood types combined characterize over three-fourths of the forest land; upland hardwoods and bottom-land hardwoods each dominate about half of the remainder. The composition of the forest type-groups based on cubic volume is shown in table 5.

Table 4. - Forest area classified according to forest condition and type-group, 1936

Forest condition	Pine	Pine hardwood	Upland hardwood	Bottom- land hardwood	Total all types	Proportion of total
	<u>Acres</u>					<u>Percent</u>
Old growth:						
Uncut	54,400	23,400	56,800	91,200	225,800	4.1
Partly cut	65,200	47,700	26,800	95,300	235,000	4.2
Total	119,600	71,100	83,600	186,500	460,800	8.3
Second growth:						
Sawlog size:						
Uncut	1,099,900	199,800	135,500	186,500	1,621,700	29.0
Partly cut	775,300	271,800	71,900	123,800	1,242,800	22.3
Under sawlog size	991,100	457,500	317,800	151,400	1,917,800	34.3
Reproduction	107,800	88,700	36,800	5,900	239,200	4.3
Total	2,974,100	1,017,800	562,000	467,600	5,021,500	89.9
Clear-cut	91,200	2,500	1,700	3,300	98,700	1.8
Total all conditions	3,184,900	1,091,400	647,300	657,400	5,581,000	100.0
Percent of total forest area	57.0	19.6	11.6	11.8	100.0	

1/ Not included are 900 acres of non-productive forest land.

Much of the original forest of central Georgia was cleared to make way for cotton in the early nineteenth century, while the greater part of the remainder has been cut for lumber in the present century. Old-growth stands, closely resembling the original timber and containing large trees particularly desirable for high-quality lumber or veneer, now occupy only 8 percent of the forest area. There is a greater area of old growth in the bottom-land hardwoods than in any of the other type-groups. Although occurring in small scattered tracts, the old-growth forests are heavily timbered; uncut stands have an average volume per acre of 8,900 board feet (green lumber tally, based on the International $\frac{1}{4}$ -inch rule), and partly cut stands, 5,600 board feet.

Table 5. - Species composition of the various type-groups

Species or species-group	Type-group				Total
	Pine	Pine hardwood	Upland hardwood	Bottom-land hardwood	
----- <u>Percent</u> -----					
Loblolly pine	62.5	33.8	5.9	1.9	43.1
Shortleaf pine	20.6	9.1	3.2	negl.	13.9
Longleaf pine	7.0	1.4	.4	.1	4.4
Other pines ^{1/}	.4	2.0	.1	.2	.6
Black and tupelo gums	1.2	9.2	8.9	32.5	8.6
Red gum	2.9	12.9	21.8	17.1	8.3
Red and white oaks	1.7	9.9	22.5	11.2	6.1
Yellow poplar	.8	8.6	15.0	6.1	4.0
Hickory	.7	4.3	9.7	.7	1.9
Ash	.2	1.0	1.1	5.7	1.4
Other hardwoods ^{2/}	2.0	7.8	11.4	24.5	7.7
Total all species	100.0	100.0	100.0	100.0	100.0
^{1/} Includes cedar					
^{2/} Includes cypress					

Much of the land once tilled has reverted to timber. Young second-growth stands (old-field and forest-grown stands combined) occupy 90 percent of the forest area (table 4), and are found in all sections of central Georgia. Approximately 51 percent of the entire forest area has second-growth sawlog-size stands—trees 9.0 inches d.b.h. and larger in pine and 13.0 inches d.b.h. and larger in hardwoods—with at least 600 board feet per acre if uncut and at least 400 if partly cut in trees of saw-timber size. Combining uncut and partly cut stands, the second-growth sawlog-size conditions contain an average volume per acre of about 4,100 board feet, or, for all growing-stock material, including the associated smaller trees 5.0 inches d.b.h. and larger, about 16 cords, including bark. Second-growth under-sawlog-size stands cover approximately 34 percent of the forest area and have an average volume per acre, in a few trees of saw-timber size, of only 200 board feet; since these stands contain many small trees, however, they have about 3 cords of cubic-foot material. Reproduction is the term applied to the youngest forest condition, in which seedlings and sprouts less than 1.0 inch d.b.h. standing 80 or more per acre, form the principal forest cover. Clear-cut areas have less than 80 seedlings per acre but may have an occasional seed tree and with fire protection may reforest naturally.

The site quality or productive capacity of the forest land, as indicated by the site index (i.e., by the height in feet of average dominant trees at 50 years), for pines compares favorably with that of other Survey units in the pine-hardwood region east of the Mississippi. Approximately 36 percent of the sites dominated by loblolly pine have an index of 80 or better; 55 percent, 70; and only 9 percent, 60 or less. Of the sites dominated by shortleaf pine, only 2 percent have an index of 80 or better; 20 percent, 70; 66 percent, 60; and 12 percent, 50 or less.

Figure 2 shows the prevailing age-class and volume distribution for the pine and pine-hardwood types (longleaf pine types excluded), which make up over two-thirds of the forest area, compared with the volume of well-stocked stands. The volume figures used are cubic feet i.b. (inside bark), and no deduction for woods cull has been made. The area and volume per acre of the forest is diagrammed from field estimates of the age-classes of the 3-3/4 million acres in the pine and pine-hardwood types. One measure of the productive capacity of the forest land is the volume on the most heavily stocked 10 percent of the present uncut forest stands, weighted by sites. That the average stocking of the forest is poor is clearly indicated by the fact that the volume per acre in the various age-classes is only one-third to one-half that found in the corresponding age-classes of the well-stocked stands.

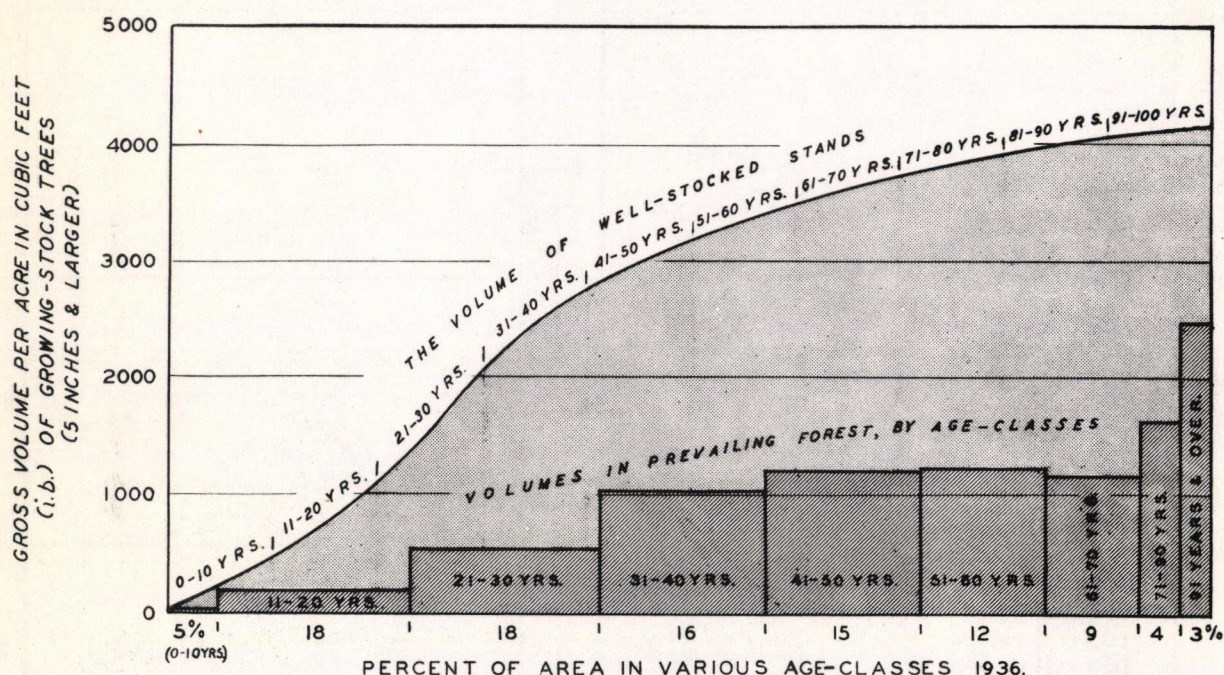


FIGURE 2 - PREVAILING AGE-CLASS AND VOLUME DISTRIBUTION COMPARED WITH THE VOLUME IN WELL-STOCKED STANDS BASED ON PINE AND PINE-HARDWOOD TYPE-AREA* OF 3,808,800 ACRES.

*EXCLUDING LONGLEAF AND SLASH PINE TYPES.

Figure 3 shows the number of sound trees by 2-inch diameter-classes (i.e., 1.0 to 2.9, 3.0 to 4.9, etc.). Two striking features are brought out: (1) the great preponderance of the trees in the 2-inch class, and (2) the relative scarcity of trees in the 10-inch and larger classes, from which the higher-priced commodities are generally produced. Of the pines, there are about 9 times as many 2-inch trees as 10-inch ones; and of the hardwoods, there are about 25 times as many. Of course, many of the trees in the 2-inch class will die before they reach maturity, as the result of fire, overcrowding, and other causes, but with fire protection a much larger number will live to increase eventually the stocking of the larger trees.

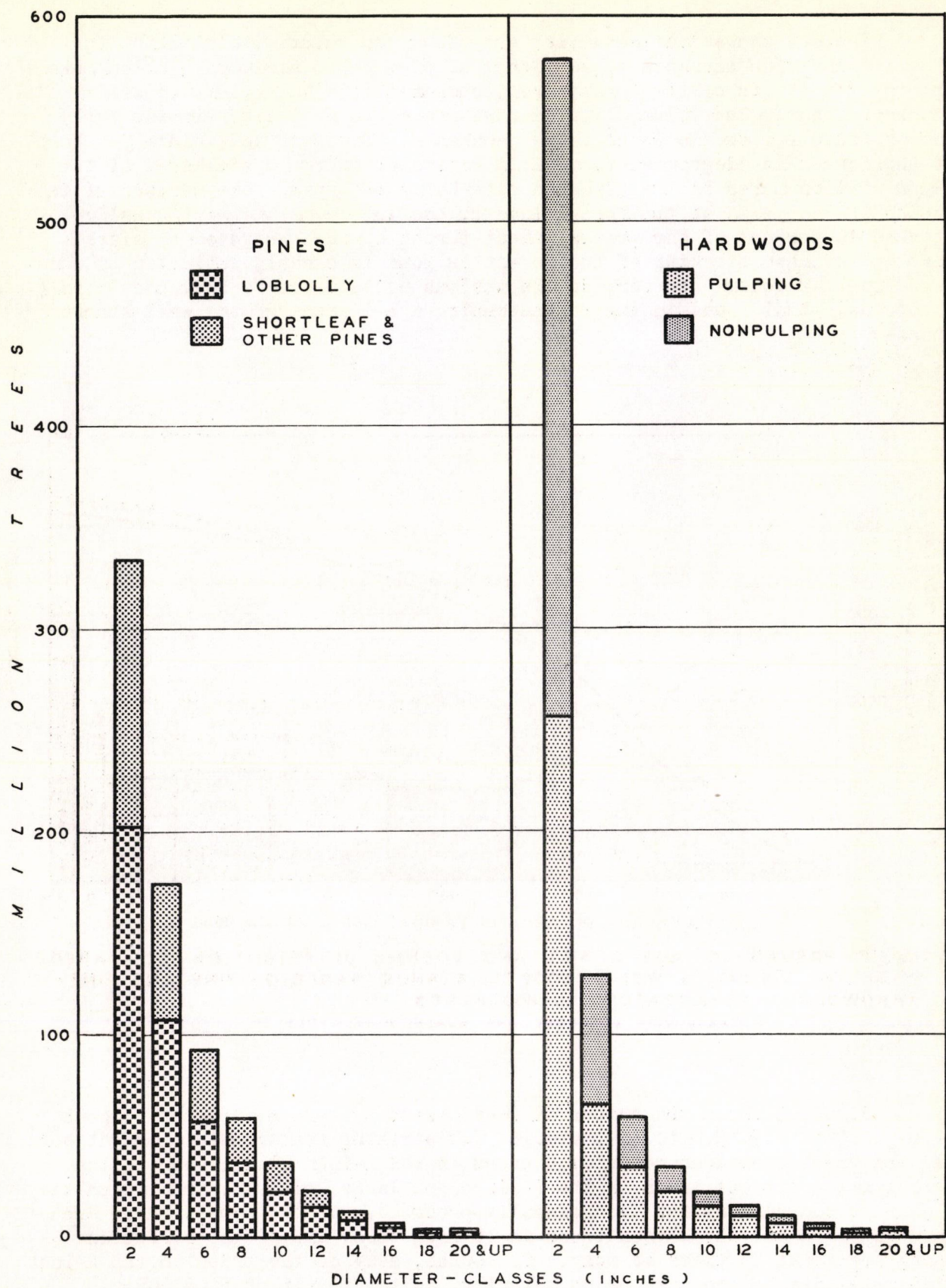


FIGURE 3 - STAND DIAGRAMS.

The stands of this area are somewhat uneven-aged, and probably will tend to become more so as the stock is built up by additional recruits following efficient fire protection. Therefore, good management policy for cutting should be based largely upon selective logging. Light cuttings should be the rule and should be as frequent as the rate of growth and economic conditions will permit. Cutting should not be restricted to certain diameter-classes, but should be made so as to give the best possible distribution of size-classes in all parts of the stands. Selective logging should aim to increase the proportion of volume in the larger trees, which yield quality material and high monetary returns.

Volume Estimates

Saw-timber volumes

The net volume of saw timber in the central Georgia unit is more than $9\frac{1}{2}$ billion board feet, according to the Doyle rule (the rule in general use in the South), or over $15\frac{1}{2}$ billion board feet, as measured by the International $\frac{1}{4}$ -inch rule, which closely approximates green lumber tally (table 6). Pines and cypress included in this estimate are at least 9.0 inches d.b.h., and hardwoods are at least 13.0 inches; and all trees have at least 50 percent of their gross volume in sound material, or contain at least one 12-foot butt log. Top diameters vary with the prevailing usable limits, but no pine logs less than 5.5 inches in diameter, inside bark, and no hardwood logs less than 8.5 inches are included. All figures are net, deductions having been made for both woods and mill cull, that is, portions of the tree which cannot be manufactured into lumber on account of fire scars, rot, sweep, crooks, bad knots, or other defects. Loblolly pine makes up 51 percent of the volume, green lumber tally; shortleaf pine, 14 percent; longleaf and other pines, 6 percent; and all hardwoods combined, 29 percent.

Table 6. - Net board-foot volume of saw timber expressed in Doyle scale and in green lumber tally 1/ (1936)

Species	Doyle scale	Green lumber tally	Species	Doyle scale	Green lumber tally
- - M board feet - -			- - M board feet - -		
Pines:			Hardwoods:		
Loblolly	4,762,100	7,954,400	Red gum	767,400	1,087,300
Shortleaf	1,139,500	2,153,400	Black & tupelo gums	658,900	929,700
Longleaf	467,700	808,500	Yellow poplar	475,100	666,300
Other	83,200	120,100	Red oaks	510,100	654,800
Total pine	6,452,500	11,036,400	White oaks	207,600	273,400
Hardwoods	3,229,500	4,515,500	Ash	72,400	107,200
Total all species	9,682,000	15,551,900	Other hardwoods ^{2/}	538,000	796,800
			Total hardwoods	3,229,500	4,515,500

1/ Green lumber tally is based on the International $\frac{1}{4}$ -inch rule, which it closely approximates.

2/ Includes a small quantity of cypress.

Table 7, which gives the volume by conditions, shows that almost four-fifths of the saw-timber volume is in the second-growth stands, while only one-fifth is in old growth. Owing to the good network of highways and country roads and the mobile logging equipment used, practically all the saw-timber stands are physically accessible for logging. The saw-timber stands, according to the Survey classification, averaged 4,500 board feet per acre, ranging from a minimum of 400 board feet per acre to as much as 10,000.

Table 7. - Net board-foot volume (green lumber tally, based on International 1/4-inch rule) in the various forest conditions, 1936

Species-group	Old growth		Second growth			Total	Percent of total
	Uncut	Partly cut	Sawlog size		Under sawlog size <u>1</u> / ₂		
			Uncut	Partly cut			
----- <u>Thousand board feet</u> -----							
Pines:							
Loblolly	651,400	338,400	4,771,300	1,931,700	261,600	7,954,400	51.2
Shortleaf	147,700	74,700	1,179,000	685,900	66,100	2,153,400	13.8
Longleaf & other <u>2</u> / ₃	122,100	135,900	440,300	179,600	50,700	928,600	6.0
Total pines	921,200	549,000	6,390,600	2,797,200	378,400	11,036,400	71.0
Hardwoods:							
Red gum	231,400	161,800	409,600	258,700	25,800	1,087,300	7.0
Black and tupelo gums	247,900	205,000	275,700	189,700	11,400	929,700	6.0
Yellow poplar	153,800	62,800	267,600	174,200	7,900	666,300	4.3
Oaks <u>3</u> / ₄	227,100	146,600	319,300	213,700	21,500	928,200	5.9
Other hwdws. <u>4</u> / ₅	232,000	191,500	300,500	159,400	20,600	904,000	5.8
Total hardwoods	1,092,200	767,700	1,572,700	995,700	87,200	4,515,500	29.0
Total all species	2,013,400	1,316,700	7,963,300	3,792,900	465,600	15,551,900	100.0
Percent of total	12.9	8.5	51.2	24.4	3.0	100.0	

1/ Mainly in residual sawlog-size trees. Includes 20,600 M board feet in the reproduction and clear-cut conditions.

2/ Includes slash pine, spruce pine, pond pine, and cedar.

3/ Includes 273,400 M board feet in white oaks, of which 54 percent is in high-grade species such as forked leaf and cow oak.

4/ Includes a small amount of cypress.

Figure 4 shows the proportional area and volume per acre of various saw-timber stands in the combined pine and pine-hardwood types (longleaf and slash pine types omitted), which occupy about $2\frac{1}{4}$ million acres. The proportions are based on gross volumes, no deductions having been made for woods cull. Stands that have less than 2,000 board feet per acre occupy 26 percent of the area but contain only 7 percent of the volume; and, conversely, stands that have 2,000 board feet or more per acre cover 74 percent of the area and contain 93 percent of the volume.

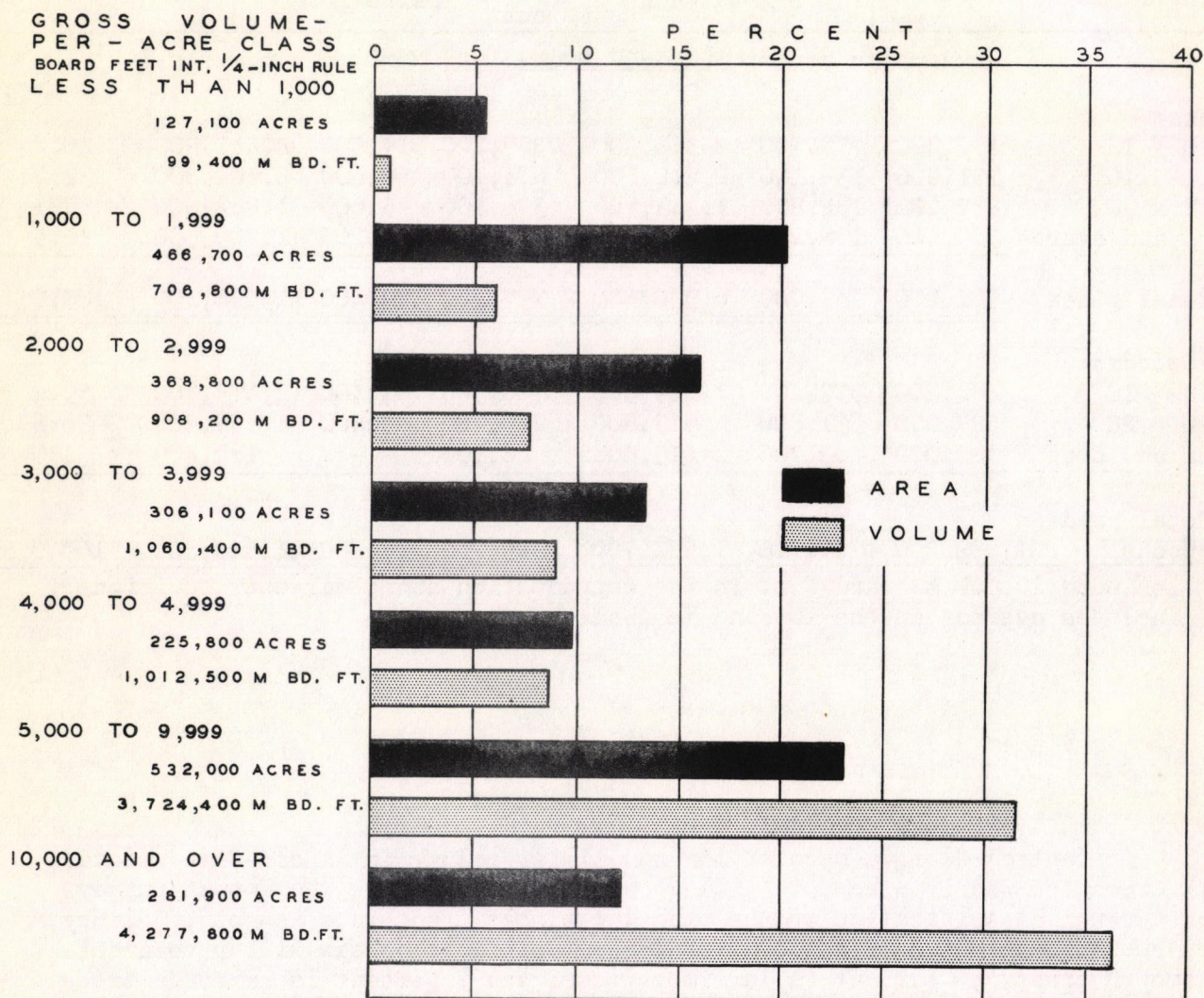


FIGURE 4 - PROPORTIONAL AREA AND VOLUME OF THE SAWLOG-SIZE CONDITIONS IN THE PINE AND PINE-HARDWOOD TYPES*, CLASSIFIED ACCORDING TO VOLUME OF SAW TIMBER PER ACRE.

* EXCLUDING LONGLEAF AND SLASH PINE TYPES.

An important point to be remembered about the forest resources is that 40 percent of the pine saw-timber volume (table 8) is made up of pines generally considered small by lumber manufacturers (i.e., trees 9.0 to 12.9 inches d.b.h.) and that 59 percent of the hardwood volume comes from "small" hardwoods (i.e., trees 13.0 to 18.9 inches d.b.h.).

Table 8. - Diameter distribution of net board-foot volume (green lumber tally, based on International $\frac{1}{4}$ -inch rule) in the various forest conditions, 1936

Species-group and diameter-class in inches	Old growth		Second growth			Total	Percent of total
	Uncut	Partly cut	Sawlog size		Under sawlog size <u>1</u> / ₄		
			Uncut	Partly cut			
----- <u>Thousand board feet</u> -----							
Pines:							
10 - 12	102,700	79,200	2,560,300	1,379,200	319,800	4,441,200	40.2
14 - 16	191,900	139,400	2,246,600	874,100	50,800	3,502,800	31.7
18 - 20	237,200	132,200	1,111,700	396,100	5,600	1,882,800	17.1
22 and over	389,400	198,200	472,000	147,800	2,200	1,209,600	11.0
Total pines	921,200	549,000	6,390,600	2,797,200	378,400	11,036,400	100.0
Hardwoods:							
<u>2</u> / ₁₄ - 18	484,200	372,200	1,029,300	706,700	81,400	2,673,800	59.2
20 - 28	527,000	331,800	513,800	280,900	5,800	1,659,300	36.8
30 and over	81,000	63,700	29,600	8,100	-	182,400	4.0
Total hard- woods	1,092,200	767,700	1,572,700	995,700	87,200	4,515,500	100.0
<u>1</u> / Includes 20,600 M board feet in the reproduction and clear-cut conditions..							
<u>2</u> / Includes cypress in the 10- and 12-inch classes.							

In central Georgia much of the saw-timber volume is in old-field stands, with trees too widely spaced to grow good-quality sawlogs. The Forest Survey made a rough classification of the pine saw-timber trees into "smooth," "limby," and "rough." As shown by table 9, 48 percent of the pine saw-timber volume is in smooth trees, 45 percent is in limby trees, and 7 percent is in rough trees. As a general rule, pine trees in the old-growth stands are generally far superior in saw-timber quality to those in second-growth stands. Also, considerable difference can be noticed among the pine species; loblolly pine trees are generally the limbiest, while longleaf pines, which are seldom found in old-field stands, are the smoothest.

Table 9. - Classification of pine saw-timber quality

Species and stand condition	Tree grade ^{1/}			Total
	Smooth	Limby	Rough	
<u>Percent of volume</u>				
Loblolly pine:				
Old growth	76	23	1	100
Second growth	28	60	12	100
Weighted average	41	50	9	100
Shortleaf pine:				
Old growth	74	25	1	100
Second growth	39	53	8	100
Weighted average	54	41	5	100
Longleaf pine:				
Old growth	95	5	-	100
Second growth	45	49	6	100
Weighted average	67	30	3	100
All pines:				
Old growth	79	20	1	100
Second growth	32	58	10	100
Weighted average	48	45	7	100

^{1/} Smooth trees have 20 feet or more of clear length and also at least 50 percent of their total usable length practically free of limbs and indications of knots; limby trees have at least 12 feet of clear length and 30 to 49 percent of their total usable length practically free of limbs and indications of knots; rough trees have less than 12 feet of clear length, or less than 30 percent of their total usable length practically free of limbs and knots.

Cordwood volume

Because of the rapid expansion of the pulp and paper industry in the Southeast, it is of interest to consider the forest growing stock from the standpoint of supplies of pulping material. The total net volume of usable cordwood, including the saw-timber material previously described, in both sound and cull trees 5.0 inches d.b.h. and larger, is slightly more than 76 million standard cords (4 x 4 x 8 feet, bark included), almost equally divided between pine and hardwoods (table 10). Of the 38 million cords of hardwoods, 25 million are in "pulping hardwoods" such as the gums, yellow poplar, and maple. At the present time, however, the pulpwood industry in the Lower South uses primarily pine, which in central Georgia amounts to nearly 38 million cords.

Four sources of cordwood material are shown in table 10. The sawlog material includes only the sawlog portions of saw-timber trees (same material as that given previously in board feet in tables 6, 7, and 8), while the remaining usable portion of the trees (i.e., the upper stems of pines and the tops and limbs of hardwoods), taken to a variable minimum-diameter but not less than 4 inches, is shown under "upper stems of sawlog-size trees." In the volume of "sound trees under sawlog size," the full stems only (without limbs) are included up to a variable minimum-diameter but not less than 4 inches. Under "cull trees" only the usable sound portion in such trees is included. Scrub oaks are classed as nonpulping hardwood culls.

Table 10. - Net volume in various classes of sound material, 1936

Species-group	Sound trees saw-log size		Sound trees under saw-log size	Sound and rotten cull trees	Total all classes	Proportion of total
	Sawlog material	Upper stems				
	----- Cords -----					Percent
Pines	24,123,400	3,447,400	9,611,400	521,400	37,703,600	49.5
Hardwoods:						
Pulping <u>1/</u>	7,812,000	4,254,800	9,352,800	3,816,000	25,235,600	33.2
Nonpulping <u>2/</u>	3,659,700	2,139,900	4,325,000	3,064,200	13,188,800	17.3
Total hwdws.	11,471,700	6,394,700	13,677,800	6,880,200	38,424,400	50.5
Total all species	35,595,100	9,842,100	23,289,200	7,401,600	76,128,000	100.0
Percent of total	46.8	12.9	30.6	9.7	100.0	

1/ Basswood, bay, box elder, cottonwood, cypress, gum, magnolia, maple, willow, yellow poplar, etc.

2/ Ash, beech, birch, cherry, dogwood, elm, hackberry, hickory, locust, mulberry, oak, persimmon, sycamore, walnut, etc., are not considered as pulping material at present.

Figure 5 shows the cordwood volume of pulping and nonpulping species by size-classes, sound trees only. Approximately 26 percent of the pine volume is in trees less than 9 inches d.b.h., the minimum for sawlog-size pine trees; and 43 percent of the hardwood volume is in trees less than 13 inches d.b.h., the minimum for sawlog-size hardwoods.

In this report, cull trees and the tops and limbs of sawlog-size hardwoods are not considered as a part of the "growing-stock" resources on which growth and drain are computed. Of the total cordwood volume--76 million cords--approximately 62 million cords are growing-stock material; 39 million cords of this are in saw-timber trees and 23 million cords are in sound trees under sawlog size. It should be remembered, however, that this growing-stock volume should not be considered as available for cutting; only the

equivalent of the net increment is the amount that can be cut without injuriously reducing the growing stock. Also, the competitive demand for saw timber and the present larger stumpage value for lumber, poles, and piles indicates the advantage of holding, wherever possible, a part of the increment of the smaller-tree growing stock for future uses. In addition to the increment of the sound-tree growing stock, there are almost $7\frac{1}{2}$ million cords of usable wood in cull trees, which if removed would make available more room for the growth of desirable trees and the establishment of the seedlings necessary to secure a continuous succession of forest crops. Cull trees of pulping species alone (pine and hardwood) contain over 4 million cords of sound wood.

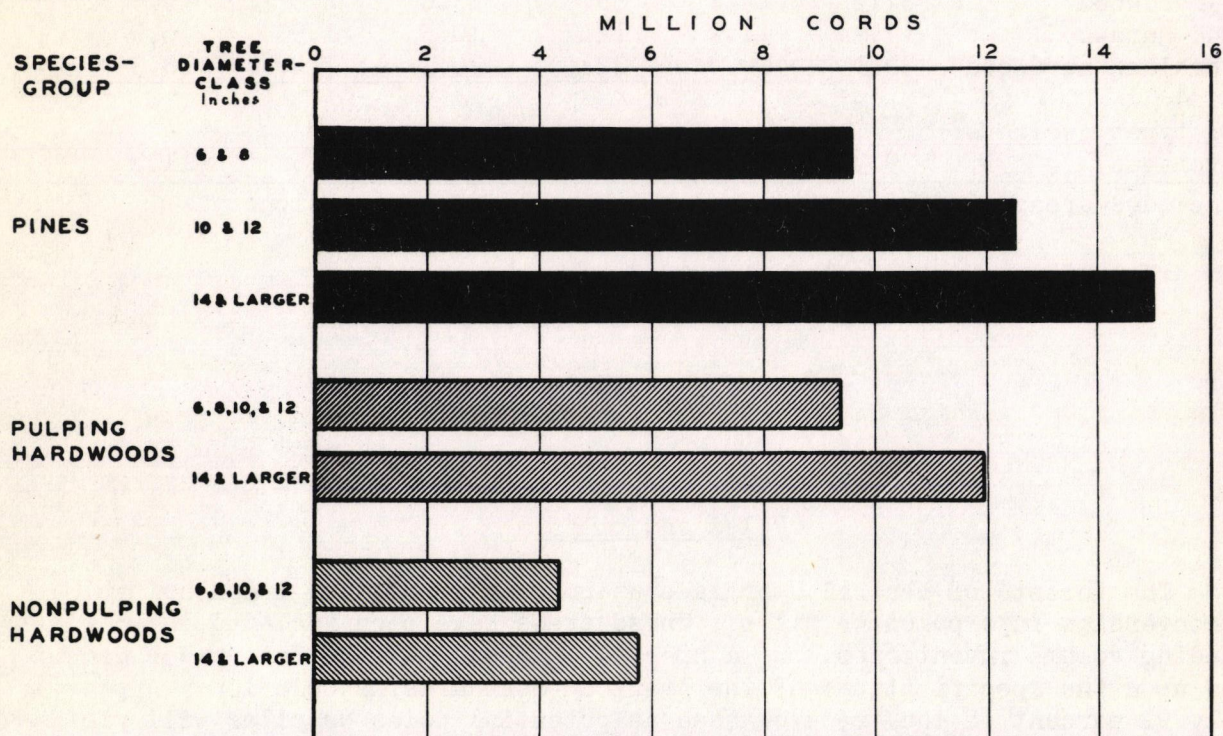


FIGURE 5- CORDWOOD VOLUMES OF PULPING AND NONPULPING SPECIES BY SIZE-CLASSES, SOUND TREES ONLY.

The average per-acre volume of the growing stock for the entire forest (all species) is more than 11 cords; for the bottom-land hardwood type-group, more than 18 cords; and for the pine type-group, 11 cords (table 11). The heaviest volumes are in the old-growth uncut stands; but the second-growth sawlog-size stands, including those partly cut, have an average of more than 10 cords per acre for each of the forest type-groups.

Table 11. - Average per acre, cordwood volume of sound trees, including bark, 1936

Type-group	Old growth		Second growth			All conditions ^{1/}
	Uncut	Partly cut	Sawlog size		Under saw-log size	
			Uncut	Partly cut		
----- <u>Cords per acre</u> -----						
Pine	37.3	17.0	18.4	10.9	3.7	11.2
Pine-hardwood	37.3	19.8	18.6	13.0	2.8	9.5
Upland hardwood	17.2	14.9	12.7	10.5	1.9	6.9
Bottom-land hardwood	30.1	20.9	22.4	16.1	7.2	18.3
All types (weighted averages)	29.3	18.9	18.4	11.9	3.5	11.2

^{1/} Includes areas of reproduction and clear-cut forest conditions.

Poles and piles

The forests of central Georgia contain over 11 million trees suitable for conversion into poles or piles. These trees have been included in the preceding volume inventories, but a special pole and pile inventory was made, based upon the specifications of the American Standards Association. Approximately 92 percent of the trees classed as potential poles or piles will yield pieces 20 to 35 feet long. Slightly more than 25 percent of the pieces are in trees 7.0 to 8.9 inches d.b.h. and probably would be useful chiefly in rural electric or telephone lines, while the majority (about 71 percent) are in trees 9.0 to 14.9 inches, the size of trees usually converted to poles and piles. As a general rule, the trees suitable for poles and piles occur singly or in groups, scattered throughout the forest, usually in the densest stands, where crowding has reduced limbs to a minimum. Owing to the difficulty of judging pole and pile material in standing trees, the estimate of the number of pieces of the various lengths, as shown in table 12, may not be entirely accurate; but the estimate of the relative proportions of the pieces of the various lengths should be fairly reliable.

Table 12. - Total number of pine poles or piles classified according to length and diameter

D.B.H. of trees (outside bark)	Pole or pile length (feet)						Total	Proportion of total
	20	25	30	35	40	45 and over		
<u>Inches</u>	<u>Thousand pieces</u>							<u>Percent</u>
7.0 - 8.9	1,639	860	335	33	-	-	2,867	25.4
9.0 - 10.9	1,659	1,225	813	288	147	-	4,132	36.5
11.0 - 12.9	743	689	595	331	185	127	2,670	23.6
13.0 - 14.9	194	274	238	227	127	151	1,211	10.7
15.0 and up	-	73	103	94	70	84	424	3.8
Total	4,235	3,121	2,084	973	529	362	11,304	100.0
Percent of total	37.5	27.6	18.4	8.6	4.7	3.2	100.0	

Forest Increment

The net annual forest increment is the volume added by growth to the individual trees, plus the merchantable volume newly created by small trees developing into merchantable sizes, and minus the losses due to mortality. This net increment of the forest volume represents, in a general way, the amount which could be cut for industrial and domestic consumption without reducing the total volume of the growing stock or forest capital.

In 1936, the net increment, before deducting the commodity drain for the year, amounted to slightly more than a billion board feet, green lumber tally, or more than 263 million cubic feet of wood, bark excluded (table 13). The increment given in board feet is for the saw-timber material only, while that given in cubic feet or cords includes the increment on the total usable lengths of all pines above 5.0 inches d.b.h., under-sawlog-size hardwoods above 5.0 inches d.b.h., and the saw-timber portion of hardwoods 13.0 inches d.b.h. and larger. No calculations of increment were made for cull trees, or for the upper stems of hardwoods.

Of the total net saw-timber increment, second-growth stands account for 93 percent; old growth, for only 7 percent. Since second-growth timber here ordinarily lacks the quality for lumber characteristic of old-growth trees, the fact that most of the net increment is in the second-growth stands should be considered whenever planning for new forest industries or for an expansion in this area of wood-products plants. Approximately four-fifths of the increment of saw-timber material is in pines; one-fifth, in hardwoods.

Table 13. - Net increment in board feet, green lumber tally, and cubic feet in the various forest conditions, 1936

Forest condition	Saw-timber material			All material		
	Pine	Hardwood	Total	Pine	Hardwood	Total
	<u>Thousand board feet</u>			<u>Thousand cubic feet</u>		
Old growth	13,700	61,400	75,100	2,300	15,680	17,980
Second growth:						
Sawlog size	558,200	137,600	695,800	99,680	47,050	146,730
Under sawlog size	274,500	25,400	299,900	81,030	17,090	98,120
Reproduction and clear-cut	1,000	100	1,100	280	190	470
Total all conditions	847,400	224,500	1,071,900	183,290	80,010	263,300

Table 14 shows the net increment expressed in standard cords (4 x 4 x 8 feet). This material is identical with that given in cubic feet in table 13, except that bark is included in the latter. The hardwood component of the increment in old-growth stands is greater than the pine, while in the second-growth stands the reverse is true. It is roughly estimated that two-thirds of the hardwood increment shown in cords is in pulping hardwoods.

Table 14. - Net increment in cords classified according to forest condition, 1936

Forest condition	Pines	Hardwoods	Total
	<u>Cords</u>		
Old growth	29,900	234,000	263,900
Second-growth, sawlog size	1,310,400	717,900	2,028,300
Second-growth, under sawlog size	1,114,800	269,000	1,383,800
Reproduction and clear-cut	3,800	2,900	6,700
Total	2,458,900	1,223,800	3,682,700

The average increment per acre in 1936, assuming that the stands were not influenced by cutting, was 195 board feet of saw timber; for all growing-stock material (saw-timber and other volume combined) in trees 5.0 inches d.b.h. and larger, it was two-thirds of a cord (table 15). These increment

figures are unusually high and compare very favorably with those in other Forest Survey units. The greatest average annual increment occurs in the uncut, second-growth, sawlog-size stands.

Table 15. - Average increment per acre in 1936 in the various forest conditions
(uninfluenced by cutting)

Forest condition	Pine component			Hardwood component			Total per acre		
	Bd.ft.	Cu.ft.	Cords	Bd.ft.	Cu.ft.	Cords	Bd.ft.	Cu.ft.	Cords
Old growth:									
Uncut	44	7.2	.09	177	39.8	.60	221	47.0	.69
Partly cut	19	3.6	.05	97	29.3	.43	116	32.9	.48
Second growth:									
Sawlog size:									
Uncut	261	46.9	.62	53	18.5	.28	314	65.4	.90
Partly cut	118	20.6	.27	43	14.3	.22	161	34.9	.49
Under sawlog size	144	42.6	.59	13	9.0	.14	157	51.6	.73
Reproduction and clear-cut	3	.8	.01	negl.	.6	.01	3	1.4	.02
Weighted averages	154	33.3	.45	41	14.5	.22	195	47.8	.67

Forest Industries

As previously pointed out, most of the original timber was cut in the early days to clear the land for agriculture at a time when practically no markets for forest products were accessible. About 1913, however, the rapidly developing stands of young timber on the old abandoned fields, together with the remaining original-growth timber, attracted a large number of small sawmills, chiefly from the Carolinas. Probably the peak of lumber production was reached about 1924, when there seemed to be a small sawmill in every patch of timber. During 1920-25, when the boll-weevil almost completely destroyed the cotton crops, many landowners were saved from financial ruin by selling their timber. Generally, however, the timber was converted into low-grade lumber, which sold at a low price, and consequently the net return to the landowners for stumpage was relatively small.

In 1936 when pine stumpage brought about \$2.00 per thousand board feet, many small sawmills had moved elsewhere, but 533 remained, only 17 of which had a capacity of 20,000 board feet or more per 10-hour day (fig. 6 and table 16). While these mills in 1936 produced an average of only 840,000 board feet per mill, the total lumber manufactured by them from logs originating both within and without the unit, was 445 million board feet. Central Georgia produced 46 percent of the lumber cut in the entire State in 1936. Although its cut that year was 26 percent greater than for 1935 and was probably larger than for any of the previous 5 years, it could be considerably

increased if market conditions warranted. Many of the sawmills are farmer owned and therefore are operated for only short periods between crop seasons. The majority of the small sawmills specialize in cutting pine "roofers" (i.e., ungraded 1-inch boards), many of which are shipped to markets in the northern and central States. As a general rule, the operations of the small sawmills are wasteful, both in the woods and at the mill, and they seldom leave standing any saw-timber trees. Approximately two-thirds of all the hardwood lumber is cut by mills that have a capacity of at least 20 thousand board feet per day.

All sawmills combined furnished 1,420,000 man-days (10 hours each) of employment in 1936. Because of the transient character of the little mills and their irregular part-time operation, it is difficult to estimate accurately the number of people actually employed full or part time, but it is believed that in 1936 about 15,000 workers were employed (mostly part time) by the lumber industry in central Georgia.

Table 16. - Number of sawmills, amount of lumber cut, and man-days of employment in mills of various sizes, 1936

Daily (10-hrs.) rated capacity	Number of sawmills	Lumber cut			Man-days of employment
		Pine	Hardwood	Total	
<u>Thousand board feet</u>		<u>Thousand board feet</u>			<u>Thousand man-days</u>
Under 20	516	303,400	24,400	327,800	1,017
20 - 39	11	39,500	30,000	69,500	229
40 - 79	6	18,500	29,300	47,800	174
80 and over	-	-	-	-	-
Total	533	361,400	83,700	445,100	1,420

In addition to the large number of sawmills in the unit, in 1936 there were 10 veneer mills, 2 treating plants, 5 dimension mills, and 3 small miscellaneous plants. Also there were about 8 gum naval stores plants producing turpentine and rosin from longleaf and slash pine trees. All forest industries combined furnished, in central Georgia, nearly 3 million man-days (table 17), which is equivalent to the regular employment of almost 15,000 men for 200 days a year. Since the harvesting, transportation, and manufacture of forest products is to a large degree a part-time occupation, it is difficult to translate man-days of labor required into number of people actually employed, but it is probable that about 30,000 people were employed in forests and mills full or part time during the year. Table 17 gives the production by the various industries from the raw material, which was taken mostly from this survey unit but partly from adjoining units. All the products are commercial except the fuel wood and fence posts, which are generally cut by farmers for their own use.

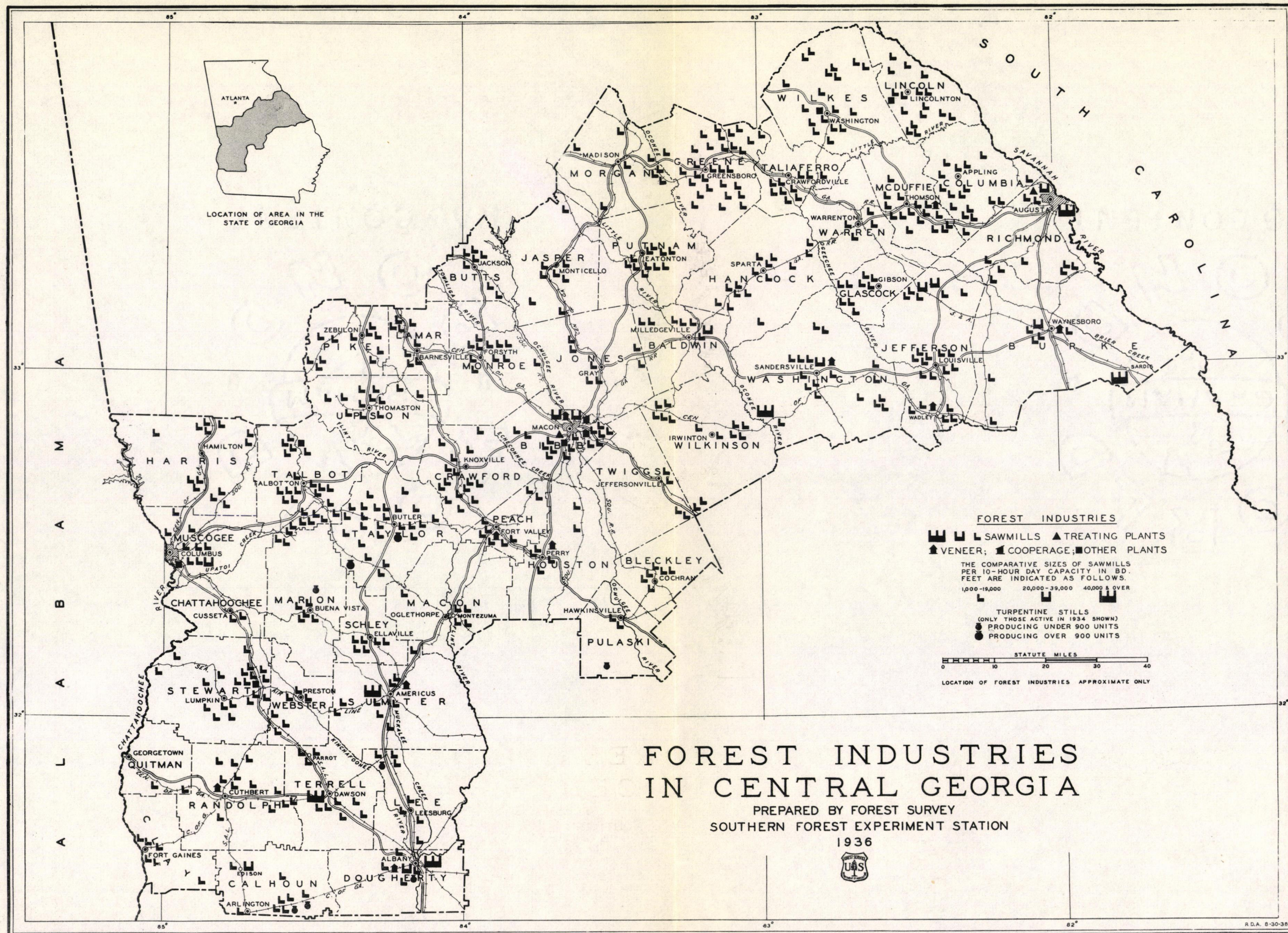


FIGURE 6 - FOREST INDUSTRIES MAP.

Table 17. -- Wood-products production and employment, 1936

Kind of plant or commodity	Units produced	Employment		
		In woods	At plants	Total
- - <u>Thousand man-days (10 hrs.)</u> -				
	<u>M bd. ft.</u>			
Lumber	445,100	479	941	1,420
Veneer	23,500	41	54	95
	<u>M pieces</u>			
Cross ties	113	15	-	15
Poles and piles	4	1	-	1
Fence posts	5,179	64	-	64
	<u>Naval stores units</u>			
Naval stores	2/ 4,980	71	4	75
	<u>Cords</u>			
Fuel wood	1,032,700	1,210	-	1,210
Miscellaneous (cooperage, treating plants ¹ /, etc.).	7,100	28	36	64
Total		1,909	1,035	2,944

¹/ For the treating plant only labor at the plant is included.

²/ A unit is made up of one 50-gallon barrel of turpentine and three and one-third 500-pound (gross) barrels of rosin.

Commodity Drain from the Growing Stock

The commodity drain in 1936 from saw-timber material amounted to 541 million board feet (table 18); while the net increment (as previously pointed out in table 13) was 1,072 million board feet of saw-timber material, after deducting mortality. This drain from the forest growing stock also includes logs cut for mills outside the unit, and the sound, usable material wasted in logging. The volumes removed from sound trees under sawlog size are not included in the saw-timber drain.

Lumber represented 84 percent of the commodity drain from saw-timber material; fuel wood, 6 percent; veneer, 5 percent; and all other commodities, 5 percent. More than three-fourths of all the saw-timber drain came from the pine component of the growing stock; less than one-fourth from the hardwood.

In 1936, the commodity drain from the total growing stock (i.e., trees 5-inches d.b.h. and larger, saw-timber and other material combined) amounted to about 131 million cubic feet, inside bark, or about 1-3/4 million cords of wood, bark included. These volumes include drain of saw-timber material, upper stems of sawlog-size pines, and small trees below sawlog size but at least 5.0 inches d.b.h. Dead trees, cull trees, and the upper stems and limbs of hardwoods are not included. Lumber accounts for approximately 63 percent of the drain from the total growing stock, fuel wood for 27 percent, and all other commodities for 10 percent. At this time pulp mills had not started to use wood from this area. The total commodity drain against the sound-tree growing stock is itemized in table 18 and allocated to the commodities for which the trees were cut.

Table 18. - Commodity drain from the sound-tree growing stock, 1936

Reason for drain	From saw-timber material			From all growing-stock material
	Species-group		Total	
	Pines	Hardwoods <u>1/</u>		
<u>M board feet (green lumber tally) M cu. ft. (i.b.)</u>				
Lumber	368,200	85,600	453,800	82,520
Cross ties	3,600	2,800	6,400	1,110
Poles and piles	400	negl.	400	70
Veneer	2,000	27,000	29,000	4,180
Fuel wood	30,300	negl.	30,300	34,920
Fence posts	600	1,200	1,800	1,860
Miscellaneous	1,200	3,100	4,300	900
Land clearing <u>2/</u>	11,100	4,300	15,400	5,110
Total	417,400	124,000	541,400	130,670

^{1/} Includes cypress.

^{2/} Includes domestic farm use.

Comparison of Increment and Drain

In 1936 the growing stock of saw-timber material increased more than 3 percent as the result of the excess of growth over drain and mortality (table 19). The net increment of the saw-timber growing stock, after deductions had been made for mortality, was approximately twice the commodity drain, with the result that there was an excess increment of 430 million board feet of pine and 101 million board feet of hardwood, a total for all species of 531 million board feet (fig. 7).

Table 19. - Balance between increment and drain of saw-timber material, 1936

Item	Pine	Hardwood	Total
Thousand board feet (Int. $\frac{1}{4}$ -inch rule)			
Net growing stock, Jan. 1, 1936	11,036,400	4,515,500	15,551,900
Growth, 1936	948,800	265,700	1,214,500
Mortality, 1936	101,400	41,200	142,600
Net increment, 1936	847,400	224,500	1,071,900
Commodity drain, 1936	417,400	124,000	541,400
Net change in growing stock, 1936	430,000	100,500	530,500
Net growing stock, Jan. 1, 1937	11,466,400	4,616,000	16,082,400

In 1936, for all growing-stock material (i.e., all sound trees 5 inches d.b.h. and larger), there was a net increase of 133 million cubic feet of wood, inside bark, all species combined, after deducting a mortality of 53 million and a cut of 131 million cubic feet (table 20). The net increase in pines alone was almost 85 million cubic feet of wood, equivalent to 1,167,000 cords of wood including bark. The 48 million cubic feet of hardwood net increase in equivalent to about 773,000 cords, of which 500,000 cords are roughly estimated to be in pulping hardwoods.

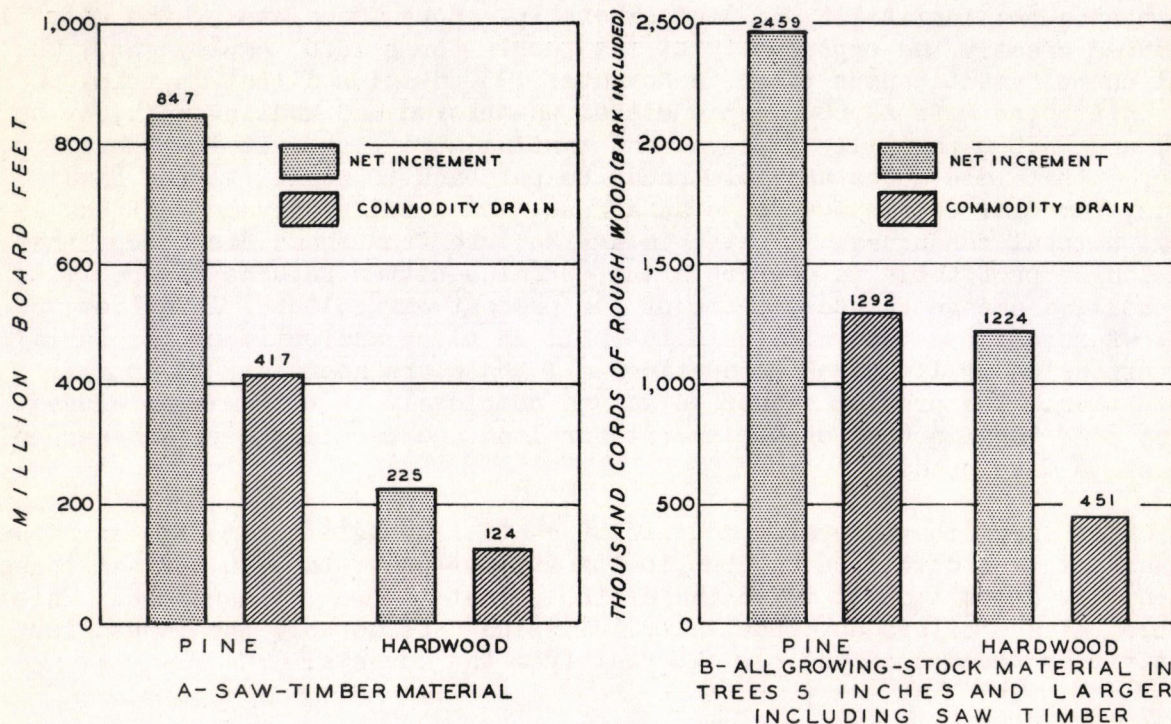


FIGURE 7 - COMPARISON OF NET INCREMENT WITH COMMODITY DRAIN, 1936.

Table 20. - Balance between net increment and drain in cubic feet, saw-timber and non-saw-timber material combined, 1936

Item	Pine	Hardwood	Total
<u>Thousand cubic feet (i.b.)</u>			
Net growing stock, Jan. 1, 1936	2,818,900	1,656,140	4,475,040
Growth, 1936	213,290	102,530	315,820
Mortality, 1936	30,000	22,520	52,520
Net increment, 1936	183,290	80,010	263,300
Commodity drain, 1936	98,320	32,350	130,670
Net change in growing stock, 1936	84,970	47,660	132,630
Net growing stock, Jan. 1, 1937	2,903,870	1,703,800	4,607,670

Review of the Forest Situation

In many parts of the area covered by this report, agriculture has been declining for several decades. Thousands of farms have been abandoned, and thousands of families have had to give up their efforts to make a living from the soil, the fertility of which has been depleted through erosion. The decline in the production of cash crops, of which cotton is chief, has reduced both incomes and standards of living and has brought about a serious maladjustment in land use with a consequent instability in land ownership. More immediately, the situation has reduced greatly the opportunity of the people for gainful employment. The special unemployment census taken in November 1937 disclosed that in this Survey unit there were 43,000 people either unemployed and wanting work, or on relief, and 24,000 partially employed and wanting more work. It is imperative, therefore, that idle acres and idle hands be put back to work. In the final analysis, remedial action must come as a result of a fuller development and use of local natural resources. A shift in agriculture from those cash crops that are no longer profitable to new crops that promise better returns to the tiller of the soil, a change in use of some of the present agricultural land from row crops to forage crops that will hold the soil in place and build up its fertility, and an expansion of livestock production—all these are necessary to improve the situation. The problem cannot be solved completely in this manner alone, however; some large source of employment for land and people other than agriculture must be developed.

Chief among the natural resources of central Georgia is its timber resource which has not been developed and put to its fullest use. In 1936 the net forest increment was approximately twice the drain against it from all sources. This favorable balance offers an opportunity to expand considerably the industries and activities based upon the raw material from the forests.

This section of the State is located favorably for the production of hydro-electric power; it has an adequate supply of suitable resident labor; and it is well located in regard to transportation facilities and the consuming markets of the East.

Not only should the present forest resources of central Georgia be utilized to the fullest extent justified under the principle of sustained yield, but the basic growing stock should be given that care and protection and that degree of thrifty management that will, as time goes on, increase its sustained-yield possibilities far in excess of the present yields. The favorable natural conditions justify the belief that the usable annual output of raw material in the form of increment eventually could be doubled under good forest management, which includes increasing the quantity and quality of the growing stock through fire protection, thinnings, improvement cuttings, selective logging, and integrated utilization.

In 1936 central Georgia had 533 sawmills (mostly in the small transient class), 10 veneer mills, and a number of other wood-products plants (most of which were small), but these plants and mills furnished neither sufficient employment to meet the needs of the people nor an adequate and sufficiently integrated market for the total present yield of the forest.

The forest is predominantly second growth, and a considerable part of the timber volume is found in old-field stands, in which many of the trees of sawlog size are often so limby and rough that they produce mainly low-grade lumber or are unsuited entirely for lumber production; in fact the Forest Survey found 52 percent of the pine saw-timber volume in central Georgia to be in limby and rough trees. This tends to limit its suitability for lumber, and consequently an outlet is needed for low-grade forest materials, both hardwood and pine.

Approximately half the area of central Georgia is within practicable rail-haul (i.e., within 150 miles) from pulp and paper mills already established at Savannah and Brunswick, Georgia; Canton and Sylva, North Carolina; and Fernandina, Jacksonville, Port St. Joe, and Panama City, Florida; prospects, therefore, for an adequate pulpwood market for the low-grade material in this part of the area are considered good. For the remaining half of the area there is at present no such market. Based on the comparison of growth and drain in 1936, in pine species alone there is an indicated annual excess of pine increment of more than a half million cords within this unit, not tributary to any existing pulp mill. Other factors being favorable, this supply of raw material should be sufficient to justify the location of a pulp mill within the unit. A pulp mill, of average size, would involve an investment of perhaps six million dollars and would provide annually about the same number of man-days of employment as does the cultivation and harvesting of 40,000 acres of cotton. The wages paid for mill and woods work usually average about three times those derived from work in the cotton fields.

Deficiencies in the present forest

When adequate and profitable markets for all forest commodities are available, landowners will have a keen incentive for growing timber. The present forest which has developed in spite of man's indifference, contain stands so poorly stocked as to number and quality of trees that usable volume is less than half what it could be under management. After many years of harvesting the larger and more valuable trees in the growing stock, the remaining stands are composed chiefly of small trees 2 to 10 inches d.b.h., as shown in figure 3. Because of a high percentage of old-field pine stands, about half the pine saw-timber volume is at present in rough and limby trees that will yield mainly low-grade lumber.

Fire is the most important factor militating against the development of well-stocked stands. Uncontrolled forest fires have for years swept through the woods, killing the small trees that are needed to recruit the growing stock as well as injuring or killing many of the larger trees. While some of the fires originate from carelessness, many of them are purposely and systematically set.

There are almost $7\frac{1}{2}$ million cords of wood in cull trees (mainly hardwoods) that should be removed in order to improve the quality and growing conditions of the stands. A large amount of wood in the tops, stems, and limbs of trees left in the forest when trees are cut could be utilized for pulp and fuel wood; this not only would add considerably to the volume of raw material available for manufacture but also would reduce the fire hazard in cut-over stands.

Measures for improvement

The forest resource is owned by thousands of individuals (almost 60% of the forest area is in the woodlands on the 64,000 farms in the unit) with varying financial limitations, and the problem of obtaining a widespread acceptance of good forestry practices, such as fire protection, stand improvement, and careful utilization, will require time and well-organized action. It will be necessary to educate landowners, wood consumers, and the general public to the value of these measures and to understand and accept their applications in practice.

In addition to sustaining a well-organized and well-directed educational program for many years, increased public aid, both State and Federal, is required for fire protection. Great encouragement has recently been given to forest landowners interested in fire protection by the adoption of an amendment to Georgia's Constitution, which creates a legal basis for county-wide forest-fire protection.

Close and profitable utilization of the wood supply will depend largely upon good markets for all the commodities the forest owner may produce. In the near future, the local industries will be forced to adapt themselves to a relatively large proportion of low-quality forest material. Landowners in their own interest, therefore, should recognize quality grades in their trees and sell or cut them for the commodities that yield the greatest stumpage returns; they should also manage their stands for the production of as much high-grade timber as possible.

Although central Georgia has none of the impressive mountains or beautiful seacoasts found elsewhere in the State, its forests and streams offer recreational opportunities that, with the exception of a small area around Augusta, have not yet been capitalized. The natural beauty of its forests, peach orchards, and ante-bellum plantation homes; and its mild, sunny, winter climate are not sufficiently known by the traveling public.

To lessen the losses from erosion and floods, to build up the forest growing stock, and to take submarginal cropland out of possible future cultivation, an effort should be made to convert abandoned fields into productive, tax-paying forests. Since in many cases to do this may be beyond the reach of private owners, it may require State or Federal participation. Of the nearly 800,000 acres of idle and abandoned cropland in the area, approximately 100,000 show advanced erosion and will require erosion-control work, including the building of check dams—usually of the inexpensive brush type ^{2/}—terracing, sodding, etc. While nature can be depended upon eventually to reforest old fields in central Georgia, it will be necessary to reforest artificially the 100,000 acres of critically eroded land if a prompt establishment of forest cover is expected. It may be expedient to plant abandoned fields that are so large or so far removed from seed trees that natural seeding from adjoining forests will be slow if not impossible. It is estimated roughly that of the total area of idle or abandoned farm land (table 2) about 200,000 acres may justify artificial reforestation, while the remaining 600,000 acres can be expected to reforest naturally.

The forests of central Georgia can be made to play a more important part in providing the people a better living and greater security. The erosion that is dissipating the fertility of the soils can be checked, the fires that annually decimate many of the forest stands can be stopped, and with good forest management, including the abandonment of cutting methods that constantly deteriorate the growing stock, the net increment can be increased enough to supply raw materials for new and expanded industries on a permanent basis.

^{2/} Meginnis, H. G. The pole-frame brush dam—a low-cost mechanical aid in reforesting gullied land. Occasional Paper No. 76, Aug. 15, 1938. Southern Forest Exp. Sta., New Orleans, La.

